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Wave Driven Turbine

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ABSTRACT

This project harvests energy from wind and floating mechanism, tomaking mechanical arrangement and usingelectronicgadgetstoproduce thelarge amountsamount of electricitycan be generatedsavinglot of money.And if implementeditwillbeverybeneficialforpublic.When boator ashipisin motionit producesvariousforms ofenergy. The motion of the ship and the waves producedcan be used to generate electrical energy. The principle involved in the project is conversion of potentialenergy into electricalenergy. There is a system to generatepower byconverting thepotential energy generatedbyafloatgoing upon wavesandback bygravitation. When the shipmoves over along wayit createsa lotof waves whichincreasespotentialenergy,whichiswasted ina conventionalrumblestrip.Whenthe floatmovesupanddown, they reciprocate a leverfitted tothe crankand slotted mechanismarrangement which inturn rotatesa shaft.The output of this shaft is coupled to a dynamo to convert kinetic energy into electricity and stored in a battery.

Keywords—wave energy, renewable energy, wind, battery.

I. INTRODUCTION

Thismoduleprovidesan Outlineand Brief Description,Includingfundamentals,Ofthedifferent Renewableenergytechnologieslikewind, Solar, Bioenergy, Hydro, Tidalandgeothermalenergy.It Providesa Generaloverviewofthe Technologiesand Theirapplications.Electricitygenerationfromwave Andtidalenergyisdiscussed. Theuseofthis Technologyislessrelevantfordevelopingcountries Asmostly These Technologiesare Still Atthe Prototypestage. Whilethesetechnologiesarenot Fullyprovenyet, Promisingresearchand Development Isbeing Conducted.The Modulealso Reviews Thecostsof Thedifferenttechnologiesand Discusses Commontechnicalandnon-Technical Barriersand Issueslimiting Thewide Spread Use/Dissemination Ofrenewableenergy In Developing Countries. Theinformationinthismoduleisof Generalinterestto Explainthebasicsofrenewable Energytechnologies, Tounderstandtheirstrengths Andweaknesses Andhencetohaveabettergraspof Thebenefitsavailablefrom, Andthebarriersfaced By,Thesetechnologies.

II. CONSTRUCTION

INTHISPROJECTWEUSEBOTHANAIR TURBINEANDA FLOATINGCRANKAND SLOTTEDMECHANISM TOGENERATE POWER.THECONSTRUCTIONOFTHESYSTEMCONSISTSOFTHE ABOVE MENTIONEDCOMPONENTS.THE CONSTRUCTION OF THESYSTEMISAS FOLLOWS THESYSTEM CONSISTSOFAHOUSINGINWHICHTHEAIR TURBINEBLADEAND THEFLOATINGBALL ARECOUPLEDAND CONNECTEDTOAGENERATOR.THEFLOATINGBALLMOVESIN A RECIPROCATING MOTION AND THERECIPROCATINGMOTION ISCONVERTED INTO ROTARY MOTION BY MEANSOFCRANK AND SLOTTEDMECHANISM.THE HOUSINGIS PLACED IN A POSITIONWHERETHEFLOATINGBALLSINKSINWATER. THE MOVEMENTOFTHESHAFTISCOUPLED TO A GENERATOR.THE GENERATORISCONNECTEDTOABATTERY.THECHARGINGOF THEBATTERY ISDONEBY MEANSOFTHEGENERATOR.

CRANKAND SLOTTED MECHANISM

Oneof themostimportantmechanismsinour lives istheslider-crank mechanism. Itisused inreciprocating enginesfor automobiles,reciprocatingcompressors,and pistonpumps.Inthisassignment youwill useExcel to calculatetheforceintheconnectingrodthatcausesthepiston toaccelerateoveritscycle.Forcesdueto combustion pressuresarenotincludedinthisanalysis.Aschematicofthe mechanismisshownbelow. ThelinklabeledListhe connecting rod. Rrepresentsthe crankarm. Wrepresentsthe weightof thepiston.Thedistanceof thepistonfromthe crankshaft bearingsisgivenbyr.Thecrank angleisθ.The angleof theconnectingrodasmeasuredfromthehorizontal isdenoted by φ.

Youwillneedtousesevenequationsinyour spreadsheet. These areprovidedbelow.Remember thatExcelneedsto haveargumentsof trigonometricfunctions(sin,cos,etc.) in radians

□□arcsin□R□sin□□

1. □L

2.r□Rcos□□Lcos□

3. Angular velocity=R/L ×

4. Velocity□□R□sin□□(□□LVel)

5.

to convertdegreestoradians.For thePhicolumn,use Equation (1). You willhavetousetheinputvaluesforRand L andtheASINfunctioninMath andTrigto computethe arcsine.The rcolumnusesthesecond andthirdcolumns and theinputvaluesofR and Lin Equation (2).

TheL-Velcolumn comesfromEquation(3)which usescosinefunctionsofthesecondandthirdcolumnsandthe inputvaluefor□.VelusesEquation(4)whichusesR and valuesyouhavealreadycomputedinother columns.L-AcccomesfromEquation(5) andusesinputvaluesR,L,and□, and valuesyou have already computed. Acccomesfrom

Equation(6) andForcecomesfromEquation(7).Ineach column, copy the formulasdown to 360degreescrankangle. ShadetheDegrees, r, Vel, Acc, andForcecolumnsbecause we aregoing to graph themnext.
Whenyour spreadsheetisfinished,formatthe numbersinthecolumnslikeI havetheminmyspreadsheet (twoplacesafterthedecimalpoint,etc.).Nowforfun,try
enteringsomedifferent numbersforR,L,□, andWjust to seewhatwillhappen to theForce.

III. WORKING PRINCIPEL

INTHISPROJECTTHEREISABEDOVERWHICHTHEHOUSINGIS
2 2 PLACED.AFLOATINGARRANGEMENTISPLACEDWITHTHE
LAcc□(□R□□□□□□□□sin□)□□(L□□LVel□sinH□O)USING. THE FLOATINGARRANGEMENT CONSISTS OF A
L□cos□
6.

CRANKANDSLOTTEDMECHANISMWHICHISCONNECTEDTOA
GENERATORTHROUGH A SHAFT.THESHAFTISALSO COUPLED WITH A WIND TURBINEWHICH ISUSED TOMAKETHEMOTION OFTHECRANKANDSLOTTEDMECHANISMTOBECARRIEDOUT
A□□R□□□cos□□(□□LVel)□R□sin□□WLITAHOccUT FAIL.THE FLOATIS KEPT INSIDE WATER, WHEN
Force□□W□□Acc
7. 386.4□cos□

Whereyou willprovideinputvaluesforR, L,□(in rad/s),andW.Velisthevelocityof thepiston,LVelisthe angularvelocityoftheconnectingrod(inrad/s),Accis the accelerationof thepiston,andLAccistheangular acceleration ofthe connection rod (inrad/S2).
Yourassignmentistousethe equations aboveto generateaspreadsheet,liketheoneattached,thatcalculates
the connecting rod force.
Provideatitleatthetopof your worksheet, “Force inConnectingRod.”Makethetitlestandouta littleby increasingitssizeandusingotherenhancements. Provide cellsforinputtingthevalues for R,L,□,andW.Putvalues of 4,12,3000and4respectivelyinthemfor now.Youcan changethem later.Placecomments(right click and choose insertcomment)inthesecellsthatsaytoenterthelengths R andLininches,thespeedofthemachine□inrpm,and the weightWinpounds.It’sagoodideatocalculatethemachine speedin rad/stoobecausethat’sthewayweuseitin calculations.Placetheradian/svaluein ahandy cell.Shade or color theinput areatosetitoff fromtherestof the spreadsheet wherekeyboardinputswill not beallowed. Selectthefourinputcells(forR, L,□, and W).
Set upheadingsfrom left to right in theorderthat I havethem in myspreadsheet. Increment crank anglefrom zeroto360degreesinincrementsof5 degrees.Inthe Radianscolumn,useaMathandTrigFunction(RADIANS)

THEREISAMOTION ORWAVEPRODUCEDTHEFLOATWILL
MOVEUPANDDOWNINSIDETHEHOUSINGAND THEUPAND

DOWNMOTIONOFTHEFLOATISCONVERTED INTOROTARY MOTIONBYMEANSOFTHECRANKANDSLOTTEDMECHANISM.
THEAIR TURBINEALSOROTATESTHECRANKANDTHE MOTIONOFTHECRANKIS TRANSMITTEDTO THEGENERATOR BYMEANSOFASHAFT. THEKINETICENERGYPRODUCEDBY THESHAFTISCONVERTED INTO ELECTRICAL ENERGYBY MEANSOFTHEGENERATOR. THEELECTRICALENERGY PRODUCEDBYTHEGENERATORISSTORED INABATTERYFOR FURTHERPURPOSE.

IV. CONCLUSION

Thusthemoduleprovidesanoutlineandbriefdescription, ofthedifferent renewableenergytechnologieslikeWind, Solar,Bioenergy,Hydro,Tidalandgeothermal energy.It providesageneraloverviewof thetechnologiesandtheir applications.Electricitygenerationfrom waveandtidal energyisdiscussed.Theuseofthistechnologyislessrelevant fordeveloping countriesasmostly thesetechnologiesarestill attheprototypestage. While thesetechnologiesarenotfully provenyet, promisingresearch anddevelopment isbeing conducted. Themodulealso reviewsthe costsofthedifferent technologiesanddiscussescommontechnical andnon-technicalbarriersandissueslimitingthewide spread use/disseminationof renewableenergyindeveloping countries.Theinformationinthismoduleisofgeneralinterest toexplainthebasicsofrenewable energytechnologies,to understand theirstrengthsand weaknessesandhencetohave abettergraspofthebenefitsavailablefrom,andthebarriers facedby thesetechnologies..

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